

U.S. Environmental Protection Agency (EPA)
Office of Water, Office of Ground Water and Drinking Water
Funding Opportunity: Reduction in Lead Exposure Via Drinking Water
Funding Opportunity Number: EPA-OW-OGWDW-19-01
Catalog of Federal Domestic Assistance (CFDA) Number: 66.443

Project Title: City of Benton Harbor Lead Service Lines Replacement Project

National Priority Area: Reduction of Lead Exposure in the Nation's Drinking Water Systems through Infrastructure and Treatment Improvements

Name of Applicant: City of Benton Harbor

Key Personnel and Contact Information:

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Project Cost:

Federal Fund Grant Request: \$14,842,995.30

Non-Federal Match: \$1,649,221.70

Total Project Cost: \$16,492,217.00

B. Executive Summary

The project will address EPA National Priority Area One: Reduction of Lead Exposure in the Nation's Drinking Water Systems through Infrastructure and Treatment Improvements.

Benton Harbor's water distribution system is about 100 years old with much of the original infrastructure still in use, including water mains and service lines. It is known that a high number of lead service lines were installed in the first half of the 20th century and many homes built before the 1960s are likely to have lead service lines or pipes that pose a health risk to residents. The City of Benton Harbor triggered an action level exceedance (ALE) for lead when the regularly scheduled testing in 2018 discovered lead was in the water and that at least 10% of the samples tested had lead levels that exceeded the action level of 15 parts per billion (ppb) for lead in water. Follow-up sample rounds in 2019 confirmed the presence of lead, and the ALE continues to present. To reduce lead exposure to residents, the city will replace all residential lead service lines within the City of Benton Harbor, estimated to be 2,383 lines. Service lines will be replaced with ¾" to 1" copper piping from the main to the home's service connection (both public and private portions).

Replacing known lead hazards in Benton Harbor drinking water will significantly improve the health and safety of over 9,800 residents in a listed disadvantaged community. It will modernize and update aging water infrastructure, providing safe and reliable water delivery for all ages and future generations.

The city has also installed corrosion control treatment following the 2018 ALE, however an optimization study has not yet been completed. A study to optimize the corrosion treatment will help ensure long term stability and reduction of lead throughout the water system. This project includes funding for an optimization study.

As part of public outreach regarding the project, an increased number of residents will have information about lead in drinking water, its harmful effects and steps to take to mitigate risk. A group of state and local stakeholders was recently formed to develop strategies for public outreach on issues regarding drinking water in the city.

The project will create a trackable, accurate GIS database of city infrastructure materials not previously recorded, which will update and upgrade the existing materials inventory.

Project outcomes include an overall reduction in lead exposure and associated health risks in the community through reduction of sources of lead in drinking water systems via infrastructure improvements.

C. Work Plan

1. National Priority Area

a. Approach. The project will address National Priority Area One: Reduction of Lead Exposure in the Nation's Drinking Water Systems through Infrastructure and Treatment Improvements.

A recent Pilot grant assessment of service line material in the city indicated 87% of residential lines had lead either at the city-owned or privately-owned side. To reduce lead exposure to residents, the proposed project will replace all residential lead service lines within the City of Benton Harbor, estimated to be 2,383 lines. Service lines will be replaced with ¾" to 1" copper piping from the main to the home's service connection (both public and private sides).

The project will also complete an Optimization Study for the existing corrosion control treatment (CCT) to minimize dissolution of lead and copper into drinking water without compromising other health-related water quality goals.

The City of Benton Harbor Water Department provides service to over 9,800 city residents, who are predominately low income. 2018 ACS data for the community indicates a demographic profile of 10.4% White, 85.6% Black, 4.9% Hispanic or Latino, and 0.2% Asian. Neighboring communities of Benton Harbor Township and City of St. Joseph have their own, separate water supplies.

At the beginning of the 20th century, the City of Benton Harbor was a thriving commercial center and popular recreation destination. Over 54 industries provided manufacturing jobs in the region. By the 1950 census, the city population had reached 18,796 residents, nearly double the city's current number. Between 1970 and 1985, thousands of jobs were lost due to closing or downsizing of local manufacturing plants. The city unemployment rate consistently exceeded twenty-five percent during that period and more than twenty percent of families were living below the established poverty level. Absentee landlords and low-income residents combined to result in deteriorating neighborhoods. Retail activity downtown evaporated. Businesses closed or left the city, drastically reducing its tax base. Beginning in 1982, the Michigan Department of Commerce ranked Benton Harbor as the state's most distressed community.

The city continued to struggle financially throughout the 1990s to early 2000s. In February 2010, Michigan Governor Granholm declared a financial emergency in Benton Harbor and in March, a state panel named an emergency financial manager to run the city. State officials reported that Benton Harbor's financial troubles included a deficit that had been growing by double digits, a pension plan underfunded by \$10 million, and the city requesting an emergency infusion of cash from the state to make its payroll.

In order to reduce deficits, the city workforce was roughly halved, shrinking from roughly 120 employees in 2010 to 60 in 2014. This was achieved through a mixture of layoffs, service outsourcing and budget cuts. In 2014, the City's finances had improved to a point

where the emergency financial manager could recommend transition to a state-appointed receivership advisory board. The City's accumulated deficit had been eliminated, expenditures were reduced substantially, and the City made 100-percent of its annual pension payments for the first time in a decade.

In July 2016, the state of Michigan fully relinquished oversight of Benton Harbor, following a recommendation from a state-appointed receivership transition advisory board. This now allows the City to manage operations and finances without oversight.

This long financial struggle for the area continues to have impact. 2018 census.gov figures list Benton Harbor MHI at \$20,232, with 46.9% of persons in poverty. Rental homes make up 68% of housing in the city, making its rental percentage the highest of all surrounding communities. The 2017 median home value in the city was \$49,200. Many neighborhoods have vacant properties and/or blighted homes. With a limited tax base, and many areas to improve, the cost burden of replacing all lead service lines in the city per Michigan Lead and Copper rules is high. The health burden of replacing them only as limited funds allow, under known Action Level Exceedance (ALE) conditions, is even higher.

The state of Michigan has demonstrated that the City of Benton Harbor meets their disadvantaged affordability criteria as determined by its Drinking Water State Revolving Fund program as shown in its 2020 Intended Use Plan. The City has included a letter requesting a reduced cost share/match of 10% in this grant application.

Funding assistance is critical for Benton Harbor to create a reliable, lead free and safe drinking water supply without compromising the progress it has made toward stronger financial health. Water rates, already the highest in the area, do not have the capacity to raise the \$16 million necessary to replace lead service lines (LSLs).

See supporting documentation in Project Narrative Attachments.

b. Known Lead Issue. Benton Harbor's water distribution system is about 100 years old with most of the original infrastructure still in use, including water mains and service lines. It is known that a high number of lead service lines were installed in the first half of the 20th century and many homes built before the 1960s are likely to have lead service lines or pipes that pose a health risk to residents.

The City of Benton Harbor initiated the development of a GIS database during a 2014 Stormwater, Asset Management, and Wastewater (SAW) Grant process. As part of the SAW project work, 2,612 water meters were replaced. In 2017, the City completed a Water System Asset Management Plan which focused on the water distribution system. The water system was added to the GIS database, however, service line data was limited to recent projects where as-builts were available. Data such as installation date, diameter, material, and location description was largely unavailable.

In May 2018, the Michigan Department of Environmental Quality (DEQ, now Department of Environment, Great Lakes and Energy/EGLE) awarded the City of Benton Harbor a \$284,000 Lead Abatement Pilot Program Grant to fund a Lead Water Service Verification

and Replacement Project. The results of the work were used to update the city Distribution System Material Inventory and Asset Management Program. Funding also allowed for the replacement of 17 lead water service lines which were identified during the project. Data collected included location, inspection date, inspection status, pipe material public, pipe size public, pipe material private, pipe size private, depth of pipe and notes.

During the investigation period of the Pilot grant, verifications and replacements were conducted simultaneously due to the known lead contamination issues from water sampling. These homes were scheduled for replacement while other homes had issues discovered during “pot holing” where a 3’x3’ hole was dug around the curb stop so that pipe material could be identified on both the privately-owned side and the City-owned side. Several homes were found to have leaking or broken lead service lines. These home were then scheduled for replacement. Locating the service line was difficult at some addresses due to the age and condition of the existing site. Many of the services were nearing 100 years in age and were missing or had buried shut offs.

Almost half of the addresses in the GIS were able to be updated with historical material information. From this dataset, a review of the buildings footprint layer identified non-vacant lots from which residential homes were randomly selected for service pipe material verification. A total of 94 homes were verified by “pot holing.” The majority of homes have lead on the City side and galvanized on the private side. The results of the field verification were recorded using GPS equipment and integrated into the GIS.

Results from the Pilot Grant have helped the City to identify the scope of lead service replacement lines that needs to occur to mitigate risk. Approximately 87%, or 2,383, of all homes in the City are likely to have lead services lines that need to be replaced.

ALE. The city triggered an action level exceedance (ALE) for lead when the regularly scheduled testing in 2018 discovered lead was in the water and that at least 10% of the samples tested had lead levels that exceeded the action level of 15 parts per billion (ppb) for lead in water. The higher levels of lead were confirmed in two subsequent sample rounds in 2019.

The September 2018 testing report for lead indicated the 90th percentile result at 22 ppb, with a range of 0-60 ppb. Nine sites were above the Action Level Limit of 15 ppb. The DEQ notified the City of an ALE in October 2018. Follow up (non-regulatory) sampling of an additional 336 samples indicated 54 location ranging from 16-62 ppb, 192 households from 1 -14 ppb and 89 households with no value for lead.

Between January 1, 2019 and June 30, 2019, City testing reported a 90th percentile value of lead at 27 ppb, again exceeding the 15 ppb Action Level limit. The range of results was between 0-59 ppb, with twelve sites above 15 ppb. July 1, 2019 to December 31, 2019 testing indicated a 90th percentile value of 32 parts per billion (ppb) for lead, continuing the ALE. The range of results was 0-72 ppb, with ten sites above 15 ppb.

A previous 2015 sample event indicated that while the 90th percentile was not over the action level in 2015, there were two samples that were above 15 ppb.

In response to the action level exceedance in 2018, the city worked to quickly install corrosion treatment and began feeding a phosphate-based corrosion inhibitor on March 25, 2019, with a modified chemical composition implemented in February 2020. Thus far, a reduction in lead levels has not been noted due to the treatment and a CCT optimization study has been requested by EGLE. This grant proposal includes funding for the optimization study.

See supporting documentation in Project Narrative Attachments – Section I. Supporting Documentation of Lead Issue.

c. Public Education. The City dedicates a page on its website to notices and resources on lead in the water supply <https://bhcit.us/water/> with a link from its home page. It issued an advisory to drinking water customers in 2018. In August 2019 and February 2020, the City sent a mailer to residents regarding the ALE for lead in the drinking water. The mailers included information on steps to take to reduce exposure to lead in the drinking water, contact information for lead testing in children, and details on how to get free water filters and replacement filters from the Berrien County Health Department. In January 2020, the City issued a press release notifying drinking water customers of another ALE in the drinking water. Several publications picked up the press release. The City also publishes and delivers to customers an annual Consumers Confidence Report with water quality results. The reports are also available on the City website 24 hours a day.

Berrien County Health Department (BCHD) has been instrumental in being a resource for the City to help inform residents and mitigate health risks. It provides information about lead, its effects and precautionary actions to take on its website <http://www.berriencounty.org/1568/Lead-Drinking-Water>.

Courtney Davis at the BCHD developed and made publicly available an easy to understand timeline of the Action Level Exceedance. Public outreach groups that consist of various governmental partners and grassroots/non-governmental groups have also been assembled to inform and educate the public on the lead risk. While the city is required to conduct public advisory and public education each time an ALE occurs, these are not necessarily tailored to residents and may not reach most people. The goal of this coalition is to engage local residents at their level and on their terms, with consistent and accurate messaging. Some goals for the group are a plain language Q&A, develop a community engagement plan, collaborate on an environmental health web page in the local newspaper, and host a community forum to give residents a voice.

Remediation follow-up monitoring is planned to ensure corrosion control treatment and LSL replacements are working as anticipated. Water sampling will occur during the project period per EGLE requirements. Results will be used to verify that lead levels are reduced as anticipated.

Additionally, the City is working with EGLE on a Technical Managerial and Financial Capacity Study to ensure the city has adequate staffing and financial mechanisms to carry out operation and maintenance of the City's water system. In May 2020, City Commissioners

approved rate increases for water and sewer service to address a water and sewer budget shortfall. Starting July 1, water rates will increase approximately 10 percent annually for the next five years and annual sewer rates will increase by 7 percent for the next five years. This increase is anticipated to bring the sewer/water fund to a self-supporting level but does not provide additional funding for lead replacement.

See supporting documentation in Project Narrative Attachments – Section I. Supporting Documentation of Lead Issue.

d. Maintaining Lead Level Reductions. All residential lead service lines are being replaced with copper, with a new service valve and valve box. This should significantly reduce contamination sources within the system and improve reliability of water service. Testing will continue to occur per EGLE requirements to monitor lead levels in residences. Testing will entail collection of two sets of Water Quality Parameter (WQP) samples, at least 24 hours apart from the entry point to the distribution system, Treatment Plant Tap and from ten locations in the distribution system. Samples will be tested twice a year, repeating every third year until both lead and copper Action Levels (ALs) are met during the entire three year period.

Additionally, to show the ALs can be met, lead and copper samples will need to be tested from 60 sites at least twice a year until both lead and copper ALs are met in two consecutive six month periods. Per EGLE, corrosion control treatment may be discontinued if the action levels are met during future rounds of monitoring. Results of the optimization study would also be discussed with various partners for consideration of implementing changes.

The City and Berrien County Health Department offer and will continue to offer lead blood testing for children and free water filters and replacement cartridges to residents. The City of Benton Harbor provides free water testing to residents as well. These services are planned to continue to maintain lead monitoring efforts.

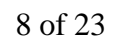
Finally, targeted sampling of sentinel sites in the water system will be conducted as part of this project in coordination with state and county public health officials. The sampling protocol has been established during the 2018 ALE and consists of sequential bottles filled after a period of stagnation. These sentinel sites offer an opportunity to see trends in the system with a good degree of detail.

e. ALE Status/Opportunity Zone. The regularly scheduled testing for Benton Harbor in 2018 and 2019 discovered lead was in the water and that at least 10% of the samples tested had lead levels that exceeded the action level of 15 parts per billion (ppb) for lead in water.

The September 2018 testing report for lead indicated the 90th percentile result at 22 ppb, with a range of 0-60 ppb. Nine sites were above the Action Level Limit of 15 ppb. Follow up (non-regulatory) sampling of an additional 336 samples indicated 54 location ranging from 16-62 ppb, 192 households from 1 -14 ppb and 89 households with no value for lead.

Between January 1, 2019 and June 30, 2019, City testing reported a 90th percentile value of lead at 27 ppb, again exceeding the 15 ppb Action Level limit. The range of results was between 0-59 ppb, with twelve sites above 15 ppb. July 1, 2019 to December 31, 2019 testing

The water distribution system is also within an Opportunity Zone area. See map below.



f. Lead Service Line Replacement Project:

1. Demonstration that the applicant has considered corrosion control as an option for reducing the concentration of lead in its drinking water.

In response to the Action Level Exceedance in 2018, the City worked to quickly install corrosion treatment and began feeding a phosphate-based corrosion inhibitor on March 25 of 2019. Monitoring of the corrosion treatment by the city operators has consisted of phosphate readings at the water plant and in distribution system. After two rounds of lead and copper samples that did not show improvement, the City was asked to modify the chemical composition and increase the target residual by EGLE staff. The City changed chemicals and started increasing dosing levels in February of 2020. Monitoring of the phosphate levels continues on a daily and weekly basis. Furthermore, the City is now required to monitor for water quality parameters at the plant tap and in distribution.

The grant proposal includes funding for an optimization study of the corrosion treatment to best ensure public health protection moving forward. The study will occur during the first year of the project. The study will assess various types and levels of corrosion inhibitors to best match the treatment to the city's source water. Results of the study would be discussed with various partners for consideration of implementing changes.

See supporting documentation in Project Narrative Attachments – Section I. Supporting Documentation of Lead Issue.

2. Plan to ensure that both the publicly-owned and privately-owned portions of a lead service line will be replaced.

The full length of LSL's on public and private property will be replaced at the same time for each residence. A full LSL replacement means that the entire service line is replaced between the water main in the public right-of-way and the customer's meter, rather than being partially replaced only between the public water main and the private property boundary.

Partial replacements of lead service lines (only up to the private property boundary) are not feasible because partial replacement is prohibited under the Michigan Lead and Copper Rule.

When completed, the project will accomplish four major benefits: (1) improving protection of public health by helping ensure a reliable, safe drinking water supply to all customers; (2) reducing public health risks associated with water main breaks; (3) reducing wasteful and expensive water losses from leaking or broken pipes; and (4) eliminating lead and galvanized service lines.

3. Plan for notifying customers of the replacement of any publicly-owned portion of the lead service line.

Prior to project start, the City will advertise and host a public meeting to review the lead service lines replacement project, the phased approach, and timelines to expect for service replacement. Multiple agencies and authorities will be present at the meeting to

answer questions and provide educational materials. Information will also be available on the City website and Facebook page.

Residents will also be notified via door-hangers and letters when work is to begin along their street. Each resident will be provided a way to identify a date and time for the contractor to enter the property. Customers will be given the name and phone number of a contact person for any construction-related problems. Multiple contractors will be solicited and engaged to complete each project phase, with a goal of completing work in the same neighborhood in a systematic process, minimizing disturbance time throughout neighborhoods.

4. Plan for notifying each customer that a replacement of any publicly-owned portion of a lead service line that is funded by this grant program will not be carried out unless the customer agrees to the simultaneous replacement of the privately-owned portion of the lead service line.

Mailings and public information meetings will highlight the requirement for replacement of the privately owned portion of the line. Additionally, information will be clear that LSL replacements will be at no cost to the owner and will require contractors to enter the home to connect the new service line to the water meter located inside the building. Contractors doing the work will have to provide adequate insurance to protect the owner against any loss that may result from damage caused by negligent construction operations on the owner's property, and require the contractor to provide the City with proof of such coverage; and guarantee to the owner that any work done shall be free from defects in material and workmanship for a period of one year from its completion.

During the Pilot grant process, legal agreements were created to establish homeowner/tenant permissions and obligations for the lead service replacement work. These agreements will be utilized for this project. An agreement to decline service line replacement will also be available to residents.

See supporting documentation in Project Narrative Attachments – Section H – Readiness to Proceed.

5. Plan for ensuring customers are provided filters certified to remove lead, in accordance with applicable standards established by the American National Standards Institute, along with no less than three months of replacement cartridges, and notifying each customer of premise plumbing flushing instructions within 24 hours of the conclusion of each lead service line replacement.

Berrien County Health Department will continue to provide free water filters and replacements to anyone who requests them. This information has been provided to residents in all mailings, and placed on the City and Berrien County Health Department websites. Instructions for installing the filters and recommendations to flush water lines for 30 days after the service replacement is completed will also be given to residents as each home connection is completed.

2. Expeditious Project Readiness to Proceed

Previous lead service line replacements occurred during the MDEQ Pilot grant project in 2018, which has provided the City with a clear process to follow for future replacements. The City is poised to proceed immediately upon approval of grant funding. The City has additionally reached out to EGLE about the proposed project, and has received their enthusiastic support.

Upon award of grant funding, the city will initiate public outreach and educational meetings about the project. It will provide a proposed project schedule on its website, map of planned phases for neighborhoods, work to be done, and details on the importance of lead service line (LSL) replacement. It will issue press releases, set up a contact person for questions, and post details and updates on its website and Facebook pages. A public meeting will be scheduled to provide residents with an opportunity to ask questions and receive details about the project. The City will invite representatives of EGLE, the Berrien County Health Department and its Engineer of Record to assist with questions. Example homeowner/resident agreements granting permission to access private property will be available for review on the city website and at the public meeting. These agreements were previously utilized for the Pilot grant project.

The City expects to utilize a four year project period to replace all residential lead service lines. Additionally, the City will seek a qualified consultant to initiate the CCT Optimization Study in Year 1, to be completed within 12 months.

There is a high probability that many of the water service lines located within the project area are composed of lead or galvanized steel. Benton Harbor's municipal infrastructure was initially installed in the late 19th through mid-20th century and complete records were not kept describing water supply line materials, although it is known that lead was widely used before 1960. Analysis of data assembled during the Pilot grant indicate it is likely 2,383 replacement connections will need to be made. During the project/bid document development stage, the City will utilize all available resources to identify known lead service lines including seeking assistance from a water infrastructure analytics consulting company such as BlueConduit, who had a successful track record of locating probable lead service lines in Flint. With the previous data of how long contractors needed for each LSL replacement during the Pilot grant, completing all replacements is anticipated to take four years. This assumes a schedule of approximately 596 replacements per year. In order to hit this milestone, up to four contractors will be engaged each project year. The City will utilize a public bidding process to select each contractor. When service replacement work is put out to bid, the contractors will be required to submit a "per each" all included price per replacement, to establish a firm total project cost without variables. This will enable the city to evaluate proposed bids on an equal basis. EGLE does not require permits for this process, and contractors would need only to acquire city plumbing permits and county soil erosion and sedimentation control permits.

Previous work from the Pilot grant indicated that a contractor could complete 1 to 2 replacements per day. Each contractor will have to perform "pot hole" investigation at the curb stop to identify lead lines. Previously identified connections in the Pilot grant will be

incorporated into contractor assignments to aid their identification efforts and potentially reduce completion time for the entire project, resulting in more immediate health benefits to residents.

A map has already been created showing four (4) zones of the entire city limits (see map in attachments). The zones are broken into four (4) subzones to identify manageable contractor scopes of residential water services to investigate and potentially replace. A corresponding table shows the number of residential water service connections in each subzone and the sum for each zone recorded in the GIS database. Replacements that were done during the Pilot grant, and work that will be done as part of the fall 2020 DWRP project are excluded in the water service lines counts.

The replacement process involves verifying the service is lead at the curb stop and then proceeding to excavate the curb stop on the main. Once exposed, the existing lead service is turned off, disconnected and removed with new 3/4" to 1" copper piping being pulled at the same time. New copper water service is reconnected to the existing curb stop, a new curb stop and the meter inside the house. A new valve box will be set, all excavations will be backfilled and lawn areas will be restored. Residential water is out of service for approximately 4 hours during the process. Bituminous paving will be replaced at the completion of each LSL replacement.

Contractors will record their progress in the ArcGIS for Collector app to integrate records into the City's GIS infrastructure database. This will allow the city to see real time, up to date progress throughout neighborhoods. An Asset Program Manager will oversee the database throughout the project. Progress reports will be regularly submitted to the City.

Utilizing multiple contractors has many advantages. It allows the City to offer contracts to a wide range of contractors (local, small, women and minority owned), it keeps pricing competitive, it provides timelines that can absorb unexpected delays, it allows the contractor bonding obligation to be lower and not bidding prohibitive, and it allows for each year's contracts to incorporate previous successful strategies and eliminate unsuccessful ones.

As the City does not employ a staff engineer, the City's Engineer of Record, Abonmarche Consultants, will coordinate public notice flyers, bidding, contract award, contractor oversight, and provide progress reports to the city, following EPA solicitation clauses as required. As EPA funded work will be able to utilize Pilot grant processes, public notice flyers, and homeowner access permission forms, the city is ready to expeditiously proceed to the next phase of lead service line replacements.

Also occurring during the LSL replacement period will be upgrades to the city water distribution system and wastewater collection system financed through EGLE's DWRP loan program. This work is planned to occur between September 2020 and October 2021. These improvements will further strengthen protection of public health by ensuring a reliable, safe drinking water supply to all customers in the project area, and preventing failures of sanitary sewers where the probabilities and consequences of structural pipe failure are high. Sanitary sewer replacement will occur in the same street segments as the concurrent replacement of the antiquated water

mains since it would be fiscally irresponsible to replace water mains while leaving in place aged, structurally deficient sewers that are likely to fail in the next few years. This combined infrastructure improvement approach is consistent with the integrated asset management idea of “dig once” that saves both valuable time and resources. The DWRP project will also replace 150 LSLs and includes repairs to the city water tower.

In evaluating the proposed action alternatives for the DWRP funded projects addressing water distribution system, three options were considered. These action alternatives were also part of the evaluation criteria of the need to replace all the existing lead service lines proposed by this project.

- a. No action - Taking no action would result in aged water mains remaining in service, with frequent breaks, broken or leaking valves, inadequate water pressures, and threats to public health from contamination. For the water tower, no action could result in ultimate failure of the vitally important asset. No action is unacceptable.
- b. Optimum Performance of Existing Facilities - Problems inherent to a pipe itself cannot be solved through improved operational efficiency. Moreover, flushing a 100-year old water main will not remove tuberculation that has built up over decades. With the exception of the water tower, this alternative is infeasible. For the water tower, optimum performance can be achieved by making the necessary repairs, as described in the previous section, to allow maximum efficiency to be achieved.
- c. Replacement - Full water main replacement, with full-length replacement of lead/galvanized service lines (LSLR) where encountered, is the only technically feasible solution that simultaneously accomplishes the following: (1) reverses the poor condition of the existing water pipe; (2) addresses technical and constructability considerations such as the comparative depths of the existing sanitary sewer and water main; and (3) resolves the pressure concern. Moreover, it is the only solution that guarantees no replacement of this antiquated water main will be required in a few years due specifically to its age and age-related condition. For the water tower, constructing a new tower is cost-prohibitive, approximately \$5 million compared to roughly half million dollars to repair.

With replacement selected as the path forward on the DWRP project, the City is leveraging additional financial commitment to the health needs of its community.

The City will continue to monitor corrosion treatment that began in 2019 during the project period. While successful corrosion control protects users from lead levels, the sheer age and poor condition of city water infrastructure poses a high risk of failure and leaks to users. In addition, sources of lead also exist within customer plumbing systems such as high leaded brass or lead/tin solder copper piping. Replacement of all lines as soon as possible produces the highest and most comprehensive health benefit to the disadvantaged community, particularly when coupled with an optimized corrosion control treatment.

With EPA funding, the City of Benton Harbor will have addressed significant conditions that

are contributing to increased concentrations of lead in drinking water. The City will continue to sample drinking water twice a year, per EGLE requirements, until it has demonstrated Action Level Exceedance is no longer occurring.

See supporting documentation in Project Narrative Attachments – Section H – Readiness to Proceed.

3. Environmental Results and Measuring Progress

a. Stated Objective. This project will support EPA Strategic Plan Goal 1: “A Cleaner, Healthier Environment: Deliver a cleaner, safer, and healthier environment for all Americans and future generations by carrying out the Agency’s core mission, Objective 1.2: Provide for Clean and Safe Water: Ensure waters are clean through improved water infrastructure and, in partnership with states and tribes, sustainably manage programs to support drinking water, aquatic ecosystems, and recreational, economic, and subsistence activities, of the EPA Strategic Plan.”

Replacing known lead hazards in Benton Harbor drinking water will significantly improve the health and safety of residents and reduce the number of communities in the nation that are out of compliance with health-based standards.

It will modernize and update aging water infrastructure in the city, providing safe and reliable water delivery for all ages and future generations. The project will leverage and multiply the benefits of the DWRP funded projects to replace portions of the city water distribution system and wastewater collection system. Modern, reliable, safe drinking water serves to advance economic development within the community by attracting and retaining businesses and residents that can increase the city tax base and contribute to its sustainability.

b. Results/Outputs. Outputs of this project include:

- A reduction in lead in drinking water provided by the Benton Harbor drinking water system due to infrastructure improvements that will replace all residential lead service lines in the city.
- A decrease in the number of lead service lines, and galvanized pipes downstream of lead service lines, in the drinking water system, resulting in a decrease in exposure to lead via drinking water. The goal is to remove all existing residential lead service lines so none remain, dramatically reducing exposure potential.
- An optimized corrosion control treatment to protect public health during and after the lead service line removal activities.
- An increased number of customers will have information about lead in drinking water, achieved through outreach and public education throughout the project. All residents receiving lead service line replacement will receive information on the effects of lead, steps they can take to protect themselves, and city remediation efforts. Public outreach will occur to the entire community.

- The project will create a trackable, accurate GIS database of city infrastructure materials not previously recorded. During the project, an asset management plan coordinator will ensure the information is accurate and complete, ensure all elements have been addressed and confirm there is a process to identify any limitations on the use of the data.

c. Projected Environmental Improvements/Outcomes. Outcomes will include an overall reduction in lead exposure and associated harms through reduction of sources of lead in drinking water systems. Recent testing has shown that residents, especially children, are currently at risk from lead in drinking water. Removing lead at a young age prevents damage to developing bodies and nervous systems that affect learning, behavior, speech, hearing, and growth rates. Pediatric blood testing results can be used to track blood lead levels to understand if reduced childhood lead exposure goals are being met.

The local public school system has also been affected by declining enrollment and reduced budgets. Students are faced with fewer resources for learning each year. Removing the lead exposure in water lines can help eradicate the harm lead is doing to developing bodies and nervous systems and lead to higher testing and learning results, which can be tracked annually.

Benton Harbor can also experience an overall improvement in health outcomes in its community through this removal of source lead. Fewer residents will have their limited household budgets overwhelmed by health care costs, leading to more financially stable households. Outcomes can be measured by tracking the number of households seeking financial assistance through welfare, Medicaid, and the Children's Health Insurance Program.

Multiple years of public outreach during the projects will also lead to an overall increase in public understanding of the health effects of lead and efforts towards the reduction of sources of lead in the drinking water system. This can be measured by analyzing the number of requests for lead blood level testing, requested water kit tests, and requested water filters in the community per year.

4. Milestone Schedule

The Michigan Lead and Copper Rule promulgated in 2018 requires municipal water suppliers to begin removing all lead service lines at a rate averaging 5 percent per year, not to exceed 20 years for completion, starting in 2021. Completion of this project will ensure that Benton Harbor has met these requirements. Additionally, funding support from this EPA opportunity will allow the City to meet these requirements without imposing additional financial hardship on residents and will dramatically shorten the exposure of a known health risk to the public from 20 years to four.

Below is the proposed Milestone Schedule for the Lead Service Line Replacement project:

Year	Task	Timeline
1	Public Outreach Meetings/ Notification Mailings	January 2021

1	Develop bid plans/specs	February 2021
1	Contract with qualified consultant to perform Optimization Study for Corrosion Control Treatment (CCT)	March 2021
1	Bidding Phase 1 & Contractor Agreements	March 2021
1	Prepare and Submit Quarterly EPA Performance and Financial Reports	March, June, September, December 2021
1	Phase 1 Project start	April 2021
1	Collect and report lead and copper sampling results to EGLE per monitoring requirements	June 2021
1	Phase 1 Project end	November 2021
1	Collect and report lead and copper sampling results to EGLE per monitoring requirements	December 2021
1	Year One Milestone Completion – 596 Total LSL Replacements by end of Year 1. \$4,160,554.25 in project costs expended. GIS database updated with field data Optimization Study for CCT initiated	December 2021
2	Homeowner/resident notification mailings Public Outreach	January 2022
2	Bidding Phase 2 & Contractor Agreements	February 2022
2	Completion of Optimization Study for Corrosion Control Treatment (CCT)	March 2022
2	Phase 2 Project start	March 2022
2	Prepare and Submit Quarterly EPA Performance and Financial Reports	March, June, September, December 2022
2	Collect and report lead and copper sampling results to EGLE per monitoring requirements	June 2022
2	Phase 2 Project end	November 2022
2	Collect and report lead and copper sampling results to EGLE per monitoring requirements	December 2022
2	Year Two Milestone Completion –	December 2022

	<p>596 New LSL Replacements. 1,192 Total by end of Year 2.</p> <p>\$8,271,108.50 in project costs expended by end of Year 2.</p> <p>GIS database updated with field data</p> <p>Completion of Optimization Study for CCT.</p>	
3	<p>Homeowner/resident notification mailings</p> <p>Public Outreach</p>	January 2023
3	Bidding Phase 3 & Contractor Agreements	February 2023
3	Phase 3 Project start	March 2023
3	Prepare and Submit Quarterly EPA Performance and Financial Reports	March, June, September, December 2023
3	Collect and report lead and copper sampling results to EGLE per monitoring requirements	June 2023
3	Phase 3 Project end	November 2023
3	Collect and report lead and copper sampling results to EGLE per monitoring requirements	December 2023
3	<p>Year Three Milestone Completion –</p> <p>596 New LSL Replacements. 1,788 Total by end of Year 3.</p> <p>\$12,381,662.75 in project costs expended by end of Year 3.</p> <p>GIS database updated with field data</p>	December 2023
4	<p>Homeowner/resident notification mailings</p> <p>Public Outreach</p>	January 2024
4	Bidding Phase 4 & Contractor Agreements	February 2024
4	Phase 4 Project start	March 2024
4	Prepare and Submit Quarterly EPA Performance and Financial Reports	March, June, September, December 2024
4	Collect and report lead and copper sampling results to EGLE per monitoring requirements	June 2024
4	Phase 4 Project end	November 2024

4	Collect and report lead and copper sampling results to EGLE per monitoring requirements	December 2024
4	Year Four Milestone Completion – 595 New LSL Replacements. 2,383 Total by end of Year 4. \$16,492,217.00 in project costs expended by end of Year 4. GIS database updated with field data	December 2024
4	Submit Final EPA Grant Reports	March 2025

5. Detailed Budget Narrative

The City GIS infrastructure database identifies 2,739 metered residential water service lines within city limits that have not been replaced. Previous service line replacements completed during the Pilot Grant project period in 2019 ranged from \$4,800 - \$7,200 per home depending on the distance from the main to the home, averaging \$6,000 per home. This included all restoration, curb and pavement restoration. When service replacement work is put out to bid, the contractors will be required to submit a “per each” all included price per replacement, to establish a firm total project cost without variables. This will enable the city to evaluate proposed bids on an equal basis.

Additionally, during the Pilot Grant service line verification process, 87% of lines verified identified lead or galvanized piping on either the City-owned or privately-owned side of the service. To establish a project budget, the City is calculating its replacement costs per the following:

2,739 service lines x 87% = 2,382.93 lines to replace

2,382.93 lines x \$6,000/line = \$14,297,580.00 to replace LSLs

Engineering Administration fees at 15% of total project cost: \$2,144,637.00

An optimization study for corrosion control treatment would also be initiated in Year 1 to be completed within 12 months. A qualified consultant would be hired to perform the study.

Optimization Study Corrosion Control Treatment - \$50,000

Total Project Cost: \$16,492,217.00

Of the total cost, the City is requesting \$14,842,995.30 (90%) from this EPA funding opportunity and is committing to \$1,649,221.70 (10%) for a cost share match. See reduced cost share/match letter requesting a 10% match due to the City’s disadvantaged status in Project Narrative Attachments.

The City will complete the LSL replacement project over a four year period, or less, depending on contractor capacity. Each year will see the replacement of approximately 596 service lines, at a cost of \$4,110,554.25. The Optimization Study’s \$50,000 cost will be incurred during the

first year of the project.

The City will utilize city income tax revenue each project year to provide its non-federal cost-share. The income tax generated \$1,684,794 during the 2018-19 fiscal year. City income tax fund projections out to 2025 show that it can incur up to \$500,000 per year (\$2 million over four years) in additional expenses, providing for the City's \$1,649,221.70 cost-share during this project. Please see funding projection spreadsheet in Project Narrative Attachments.

Contractual expenses will include contractor labor costs for excavation of the curb stop on the main, disconnection and removal of old line, pulling of new copper piping, reconnection of piping to the existing curb stop, and restoration of pavement and lawn areas as needed. Contractor materials cost include 3/4" to 1" copper piping, new curb stops, new meters inside the house and new valve boxes.

Engineering administration tasks will include preparation of bid documents, overseeing bid process, executing contractor agreements, providing public education and outreach about the project, notifying residents of project timeline, acquiring property access agreements from residents, overseeing contractor work, reviewing and approving contractor requests for payment, tracking and recording LSL replacement data in GIS database, final inspections and closeout of project.

Expenses for the Optimization Study for Corrosion Control Treatment will be consultant cost for professional evaluation of the various types and levels of corrosion inhibitors to best match the treatment to the city's source water, thus minimizing dissolution of lead and copper into drinking water without compromising other health-related water quality goals.

6. Programmatic Capability/Experience

a. Organizational Experience

The City of Benton Harbor is a local unit of government. The city charter became effective on April 14, 1945. Under that charter, the city is governed by a council-manager system that combines the political leadership of nine elected commissioners with the professional expertise of a city manager appointed by the commissioners.

The City Manager is the chief administrator of Benton Harbor and is responsible for the day-to-day administration of the city. The manager implements the council's policies and programs while coordinating the delivery of services throughout the city through the various departments in city government. The City Manager will oversee the LSL replacement project, providing regular updates to the City Commission. Current City Manager, Ellis Mitchell, has served as city manager for three other cities – Berkeley, Mo., East St. Louis, Ill., and East Point, Ga, bringing a wide understanding of city management to the project. The City Manager also oversees compliance with multiple federal, state and local funding sources involved in city projects and is well prepared to follow EPA compliance requirements.

The city water distribution system is managed by the Benton Harbor Water Department, under the direction of Mike O'Malley. Recently, City staff successfully oversaw and

completed the modernization and upgrades of the city water filtration plant over a two year period, ending in 2011. The Water Plant now has an anticipated life span in excess of 50 years and can properly treat up to 12 million gallons per day. Funding for the project was acquired through the State of Michigan's Drinking Water Revolving Loan Funds (DWRF), supplemented by American Recovery and Reinvestment Act (ARRA) funds.

The Community and Economic Development strives to foster a better quality of life for Benton Harbor residents by developing viable neighborhoods with safe, suitable housing and by eliminating slums and blight. It oversees the City Home Rehabilitation Loan Program, CDBG program, Vacant Lot Revitalization Purchase Program and other grant funded programs benefitting residents. This department will oversee EPA grant compliance throughout the duration of the project.

The City of Benton Harbor utilizes its engineer of record firm, Abonmarche Consultants, to provide civil engineering expertise and guidance on municipal infrastructure projects, as the city does not employ a staff engineer. Abonmarche has assisted the city for over 25 years and has a strong working relationship with staff and comprehensive understanding of city infrastructure needs. The firm has assisted with multiple projects funded through a variety of sources including federal and state grants and state loans. The City will utilize results from previous Abonmarche water studies and upgrades to identify and complete the citywide lead service line replacement project.

The City has also had initial discussions with Cornwell Engineering Group, a qualified engineering consultant, for the purposes of conducting an Optimization Study for Corrosion Control Treatment. Cornwell Engineering Group was founded in 1985 by Dr. David A. Cornwell, after his successful career as a Professor at Michigan State University. Cornwell Engineering Group utilizes the latest innovations and sound scientific fundamentals in the pursuit of optimizing and designing water facilities.

b. Staff Expertise/Qualifications

Key City staff on the project, representing three FTE workers, include:

Ellis Mitchell, City Manager – Mr. Mitchell has been City Manager since January 2020, after acting as Interim City Manager since July 2019. Mr. Mitchell had previously served as City Manager for Benton Harbor from 1983 to 1987. He brings more than 40 years of comprehensive achievements in public, private and educational sectors to the City of Benton Harbor. He has managed four cities (Benton Harbor, MI, Berkeley, MO, East St. Louis, IL, and East Point, GA) saving two from State Receivership. He has provided management consulting services for cities and private sector companies. He has led planning and implementation of balanced Operating Budgets and 5 Year Capital Improvement Programs in several cities, stabilizing and improving financial management. He has served as Project Manager over major bond issues, developments, and several capital funding projects from planning, negotiating and throughout the construction process. His comprehensive experience will provide strong support throughout the LSL replacement project.

Michael O'Malley, Water Department Superintendent – Mike has over 30 years of experience working in water treatment plants. He has been Benton Harbor Water Department Superintendent since July 2016, additionally holding the position between 2008-2012. He is an F-1 and S-1 licensed Operator in Charge. Mike oversees Water Plant operations and maintenance, water distribution, sewer collections and storm water management for the City of Benton Harbor.

Tracy-Ann Jennings, Community and Economic Development Director – Tracy has over 15 years of experience and understanding as it relates to: Grant Application and Reporting, Employee Management and Supervision, Human Behavior Analysis, Leadership Coaching, Volunteer Management, Youth Development, and Nonprofit Leadership. Her strengths lie in community outreach and engagement, creating and executing major events, developing and sustaining strategic relationships, working with local media, communications and community relations, forecasting and strategic planning. She will act as a key member of the public outreach team and track grant compliance.

Abonmarche Consultants, Inc - Abonmarche Consultants, Inc., is a professional consulting firm specializing in civil engineering, surveying, architecture, marina development, landscape and planning services. The company was established in 1979 and became the Engineer of Record for the City of Benton Harbor in 1994. The City does not employ its own engineering staff and instead utilizes the professional expertise provided by Abonmarche as their Engineer of Record. Abonmarche has assisted the city with multiple projects involving grant or loan funding and is well versed in compliance, procedures and reporting documents. Abonmarche led the FDCVT and Pilot grant projects and will be able to guide the lead service replacement project with a thorough understanding of the City's infrastructure, community and municipal needs.

The project will utilize the following key Abonmarche staff:

Jason Marquardt, PE - Jason is a licensed Professional Engineer with more than 16 years of experience. He is responsible for managing, designing, and providing construction engineering and administration on municipal, local agency and state projects. He currently serves as Group Director of the Construction Division at Abonmarche. He has worked on a variety of civil projects that include infrastructure design, sanitary sewer, storm sewer, and water distribution system construction. He was project manager for the City of Benton Harbor's 2017 and 2018 FDCVT grant projects and the Pilot Grant project. His knowledge of the City of Benton Harbor's water infrastructure will contribute important guidance to the project team.

Corey Kadow, PE - Corey has over 20 years of experience in design and construction administration of municipal and site development infrastructure, street reconstruction, drainage, engineering studies, permitting, waterfront development and recreational facility projects. His responsibilities also include plan preparation, project design, and cost estimating. Corey's projects have utilized multiple federal, state and local grant and loan funding sources including MDOT, MEDC CDBG, USDA Rural Development, SRF/DWRF

loan and DNR Recreation grants and Corey understands the wide range of compliance necessary for each funding source.

In each of his roles, Corey is committed to ensuring that quality projects are built to exceed the client's expectation and remain within budget. Corey has acted as project manager for multiple City of Benton Harbor projects.

Bret Witkowski - Asset Management Program Coordinator - Bret will lead efforts to further develop and complete the infrastructure asset management programs for the City of Benton Harbor. Prior to his position at Abonmarche, Bret served Berrien County as the County Treasurer for 20 years. In addition to his position of County Treasurer, Bret served on multiple financial review committees for villages and communities throughout Berrien County. He is Chairman of the Berrien County Land Bank, which received \$10 million in grant funding to remove blight in distressed Berrien County communities during his tenure. His experience with funding and conducting public relations and awareness campaigns will greatly assist project efforts.

Joelle Regovich – Grant Administrator – Joelle has over 7 years of experience overseeing grant related efforts for a variety of Abonmarche clients. She seeks out relevant funding sources to support projects, writes grant applications, and performs grant administration on awarded funds. Her experience includes a wide range of federal, state and local grants and funding sources including USDA Rural Development grants and loans, Michigan Economic Development Corporation CDBG and Infrastructure Capacity Enhancement (ICE) grants, Michigan Department of Natural Resources Recreation Grants, Michigan Council for Arts and Cultural Affairs grants, and Michigan State Historic Preservation Office (SHPO) Lighthouse Assistance Program grants. She will work closely with City staff to ensure grant compliance is met throughout the project.

Please see resumes in Project Narrative Attachments – Section F. Biographical Sketches

7. Past Performance. Recent relevant grants received by the City of Benton Harbor in the past three years include two Financially Distressed Cities, Villages and Townships (FDCVT) grants and one Pilot Grant from the Michigan Department of Environmental Quality (DEQ). The City has a long history of completing a variety of grant projects.

2017 FDCVT Grant – Cities, villages and townships experiencing financial struggles were offered grant funds by the Michigan Department of Treasury to help fund special projects, services or strategies that move a city, village or township toward financial stability. In 2017, the City of Benton Harbor received \$396,085 for water system enhancements that included water main replacements on Territorial and Sherman Streets and water valve replacements. The City had previously received FDCVT grants in 2015 and 2016, which assisted in the replacement of additional water mains and fire hydrant repairs. As a result of careful oversight and financial management practices, the City was able to request a reallocation of unused 2015 and 2016 funds toward its 2017 project, reducing its cost share of the water main work.

Throughout the grant period, the City complied with grant requirements such as approving resolutions, returning signed agreements, using funds only as authorized by grant scope,

following purchasing and bid requirements set forth by funding agency, providing adequate supporting documentation for expenses i.e. cancelled checks and invoices, following accounting practices to keep grant funds separate from other accounts, communicating with Treasury Department to update any status change or amendment request, and following all local, state, and federal laws. The grant requires completion of the project within five years of the award. The City completed all work in 18 months. Semi-annual progress and financial reports as required by the grant were completed each period on time. Progress reports indicated percentages complete toward stated goals for scope.

2018 FDCVT Grant – In 2018, the City received a grant award of \$309,500 to replace 238 water meters that were outdated and obsolete. Project work began in September 2019 and will be completed by May 2021, after experiencing delays due to the COVID-19 pandemic.

During the grant period, the City has complied with grant requirements such as approving resolutions, returning signed agreements, using funds only as authorized by grant scope, following purchasing and bid requirements set forth by funding agency, providing adequate supporting documentation for expenses i.e. cancelled checks and invoices, following accounting practices to keep grant funds separate from other accounts, communicating with Treasury Department to update any status change or amendment request, and following all local, state, and federal laws. Semi-annual progress and financial reports as required by the grant have been completed each period. Progress reports track percentages complete toward stated goals for scope.

2018 MDEQ Pilot Grant – The Michigan Department of Environmental Quality (MDEQ) Drinking Water and Municipal Assistance Division provided a grant award of \$284,000 to the City of Benton Harbor as part of a pilot program to improve water supply system infrastructure to help protect water quality and public health. The grant award was used to fund an inventory of the material of service lines, update the city asset management plan, and replace lead water service lines. Ninety-four (94) verifications and 17 replacements were completed between December 2018 and May 2019. Information was recorded in a GIS database.

Grant deliverables included an Asset Management Plan Certificate of Project Completeness which includes the AMP Executive Summary, and a Lead Service Line Replacement Certificate of Project Completeness which verifies that a Notice to Proceed was issued for the project. Both of these requirements were completed and delivered to the DEQ/EGLE within the project period.

8. Reduced Cost Share/Match Waiver Request Letter and QA/QC

- a.** Please see reduced cost share/match request letter in Project Narrative Attachments.
- b.** QA/QC – Not Applicable. Environmental Data will not be collected or used in this project.